CatLinc™ Net User's Manual

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Important Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10) Only use attachments/accessories specified by the manufacturer.
11) Unplug this apparatus during lightning storms or when unused for long periods of time.
12) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

FCC Compliance

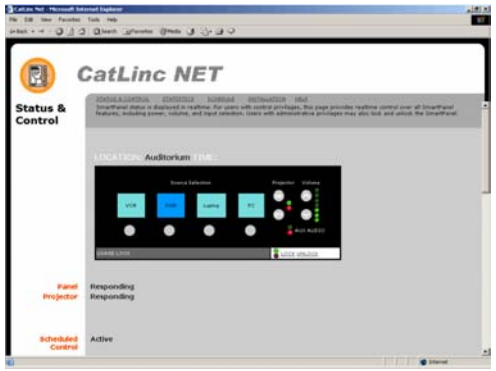
This equipment generates radio frequency energy and if not installed in accordance with the manufacturer's instructions may cause radio interference.

This equipment complies with part 15, Subpart J of the FCC rules for a Class A computing device. This equipment also complies with the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications. These above rules are designed to provide reasonable protection against such interference when operating the equipment in a commercial environment. If operation of this equipment in a residential area causes radio frequency interference, the user and not SP Controls, Inc., will be responsible.

Changes or modifications made to this equipment not expressly approved by SP Controls, Inc., could void the user's authority to operate the equipment.

SP Controls, Inc. assumes no responsibility for any errors that appear in this document. Information in this document is subject to change without notice.

Part I. Introduction



CatLinc™ Net Web Interface

The CatLinc™ Net is a network interface and Internet gateway to the SP Controls SmartPanel™ Control System, and by extension to the A/V equipment the SmartPanel controls. It is a plug-and-play device that requires no programming. The CatLinc Net provides the following features:

- **Remote Monitoring and Control:** CatLinc Net provides real-time web-based control and monitoring for the SmartPanel from any Internet connection, anywhere in the world.

- **Security:** With the CatLinc Net you can schedule-lock the SmartPanel, preventing unauthorized access to projector control during hours when your school or business is closed. If the projector you control allows 2-way RS-232 communication, the CatLinc Net can also be configured to email security notifications if it loses contact with the SmartPanel or the projector.

- **Maintenance Support:** If the projector you control allows 2-way RS-232 communication, CatLinc Net will send an email alert to maintenance when the projector is nearing the end of its lamp life or if the projector breaks down. Once connected to the network, the SmartPanel and CatLinc Net can be configured and updated over the Internet. Update projector drivers and firmware with the click of a button.

- **Information Gathering/Reporting:** CatLinc Net can be configured to report valuable usage information and statistics including total usage hours, usage by source, and lamp hour tracking. Information on how equipment is really being used will save you money in future purchasing. The CatLinc Net can be configured to email maintenance reports on a periodic basis.

Technical Overview

CatLinc Net is a minimal implementation of an HTTP web server. In addition to serving HTML pages, it is capable of sending SMTP email, issuing and responding to ARP requests, and querying Simple Time servers. CatLinc Net uses RFC-compliant light implementations of the following networking protocols: HTTP including SimpleAuth, TCP/IP, UDP, SMTP, and ARP. Its physical layer is 10mpbs Ethernet. CatLinc Net responds to pings.

Because the CatLinc Net requires a static IP address, **it is not compatible with DHCP**.

System Requirements

The CatLinc Net is designed for use with the SP Controls SmartPanel projector control interface. The SmartPanel must be running firmware version 1.01 or higher. Compatible firmware ships in SmartPanels manufactured as of May of 2003 or later.

You can verify your SmartPanel firmware version by connecting to the SmartPanel with the SP Controls Product Configuration Utility. The firmware version of the Panel is displayed in the bottom bar.

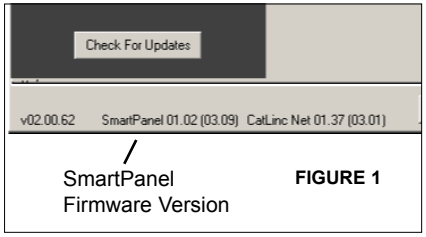


FIGURE 1

If you do not have compatible SmartPanel firmware, a firmware upgrade can be ordered from SP Controls (no. *SP2-FW-UPG-V1.10*).

A standard active Ethernet connection to your WAN or LAN (hereafter 'LAN') on UTP, STP, or FTP (i.e., CAT5) with a standard RJ-45 termination must be available at the CatLinc Net installation point.

Note: The CatLinc Net cannot be used with a SmartPanel Master/Slave installation.

CatLinc Net Access Security

CatLinc Net is a proprietary, closed-source, monolithic application running on an embedded microcontroller. It does not run any operating system, cannot provide terminal /.shell access, does not contain a file system, et cetera. As a result it is incapable of being compromised in the manner of a conventional system and cannot be used to launch DoS attacks, et cetera.

Consequently, security considerations with CatLinc Net are limited to discouraging unauthorized control of the room A/V systems to which it provides access, and preventing nuisance reconfiguration of the product (e.g., changing its IP address).

CatLinc Net implements two types of security: User ID/Password based challenges for two levels of access via HTTP's built-in Simple Authorization mechanism (control-only user, administrator with reconfiguration rights); and IP-based access control screening, which prevents control except from specific IP address ranges.

Part II. Configuration

Configuration and Installation Overview

The CatLinc Net is configured using the PC-based SP Controls Product Configuration Utility. The Product Configuration Utility is included in the CD-ROM that ships with the SmartPanel. It is also available for download from our web site at www.spcontrols.com.

CatLinc Net can be configured either through RS-232 or TCP/IP. However, the initial configuration must be made via RS-232. Once it is configured with an IP address it will be network-addressable and can then be configured via TCP/IP.

Configuration and installation of the CatLinc Net requires the following steps:

1. Initial configuration of the CatLinc Net with a PC or laptop via RS-232 (*Part II* of this manual),
2. Physical installation of the CatLinc Net with a fully-configured SmartPanel system (*Part III* of this manual), and
3. Final connection and control via TCP/IP (*Part IV* of this manual).

Configuration Setup

1. What You Need

To configure the CatLinc Net via RS-232 you will need the following:

- A **PC or laptop** running the latest version of the **SP Controls Product Configuration Utility**, version 2.0.41 or higher (required, available for free download from SP Controls at www.spcontrols.com).
- A **12VDC power supply** for the CatLinc Net (required).
- A **null-modem serial cable** or adapter (required - included).
- A **LAN connection** for your **PC/laptop** (recommended).
- A **LAN connection** for your **CatLinc Net** (recommended).

In addition, you will need the following information from your Network System Administrator:

- A dedicated **static IP address for the CatLinc Net** (required). This IP must be permanently assigned to the CatLinc Net. The CatLinc Net is not compatible with DHCP.
- The **IP address** of local LAN **gateway** (required).
- The **subnet mask** for the LAN (required).
- The **IP address** of a **time server** providing Simple Time on Port 37 via UDP (recommended - required for time-based functions such as scheduled lockouts).
- The **IP address** of an **SMTP** (mail) server on the LAN (recommended - required for email security and maintenance notification).

Note: You will find a *Configuration Worksheet* (pages 39-40) to facilitate collecting necessary information.

2. Connecting the CatLinc Net to your PC

The SP Controls Product Configuration Utility is a simple application that can be used to configure multiple SP Controls products separately or simultaneously. The Configuration Utility can be run on any Microsoft™ Windows™-based PC or laptop. The Configuration Utility ships with the SmartPanel and SmartPanel firmware upgrade. It is also available for download on our web site at www.spcontrols.com.

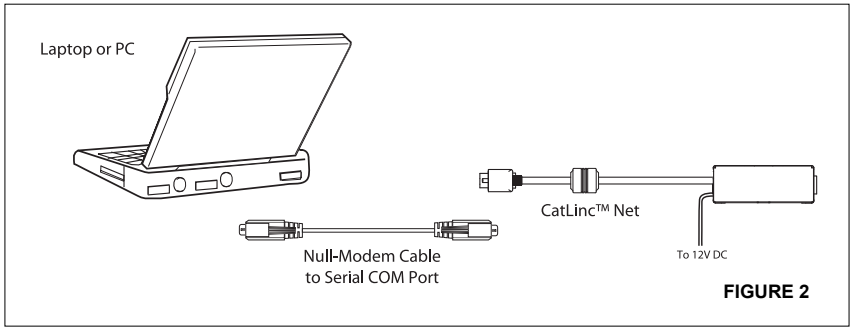


FIGURE 2

To connect your PC/laptop to the CatLinc Net for configuration:

1. Apply 9-12VDC power to the CatLinc Net. Power can be drawn from the SmartPanel (see *Part III. Installation - Powering the CatLinc Net*, page 20 below).

   TIP: You can borrow the 12V power supply from the SmartPanel to power the CatLinc Net for configuration. Simply unscrew the wires from the captive screw connector attached to the end of the power supply and connect it to the captive screw connector that ships with the CatLinc Net. *Polarity must be correct*, so if you do not see the *POWER LED* illuminate, try flipping the orientation of the wires.

2. Connect a **null-modem** serial cable (provided) or a serial cable with a null-modem serial adapter to the COM port on your PC/laptop.

3. Connect the null-modem serial adapter to the male DB9 of the CatLinc Net.

4. Launch the SP Controls Product Configuration Utility on your PC.

Configuration

Note on DNS: If your PC or Laptop has a network connection at the time of installation, you can use DNS to retrieve IP addresses for *known domain names only*. You cannot assign a new DNS entry in these fields.

1. Finding Device

Select the appropriate COM port in the pull-down menu. Initial configuration of the CatLinc Net must be via RS-232. Subsequently the unit can be reconfigured via TCP/IP by selecting TCP/IP in the drop-down menu and entering the CatLinc Net's IP Address and pressing *ENTER*.

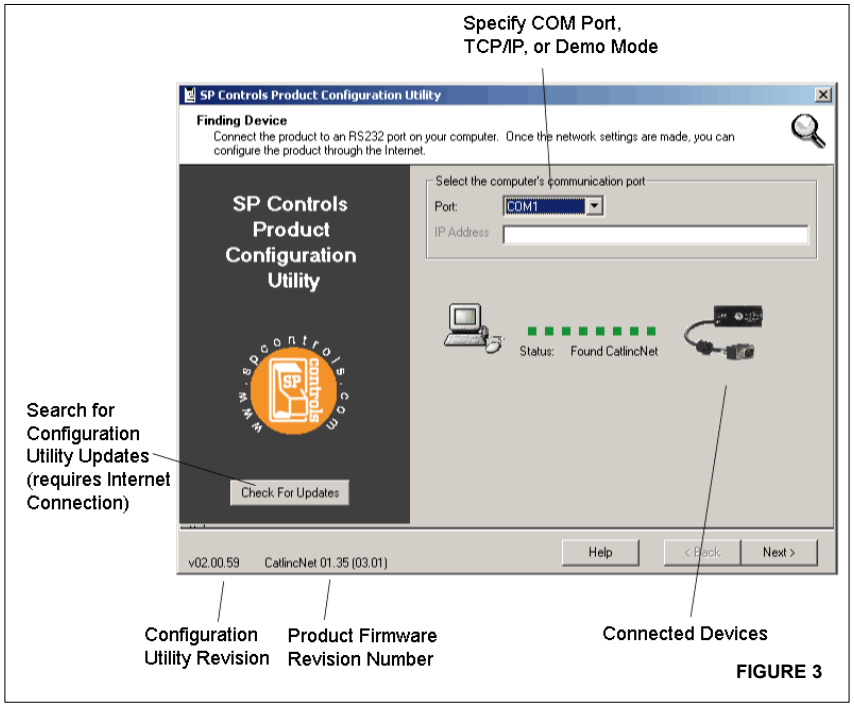

Specify COM Port, TCP/IP, or Demo Mode
SP Controls Product Configuration Utility
Finding Device
Connect the product to an RS232 port on your computer. Once the network settings are made, you can configure the product through the Internet.
SP Controls Product Configuration Utility
Select the computer's communication port
Port:
COM1
IP Address
Status: Found CatlincNet
Search for Configuration Utility Updates (requires Internet Connection)
Check For Updates
v02.00.59
CatlincNet 01.35 (03.01)
Help
< Back
Next >
Configuration Utility Revision
Product Firmware Revision Number
Connected Devices

FIGURE 3

When the Configuration Utility establishes contact with the CatLinc Net the icon will indicate that the CatLinc Net has been found.

2. Networking Essentials

On this page you will configure the CatLinc Net networking information so that it can be targeted by network devices and browsers and communicate with the outside world.

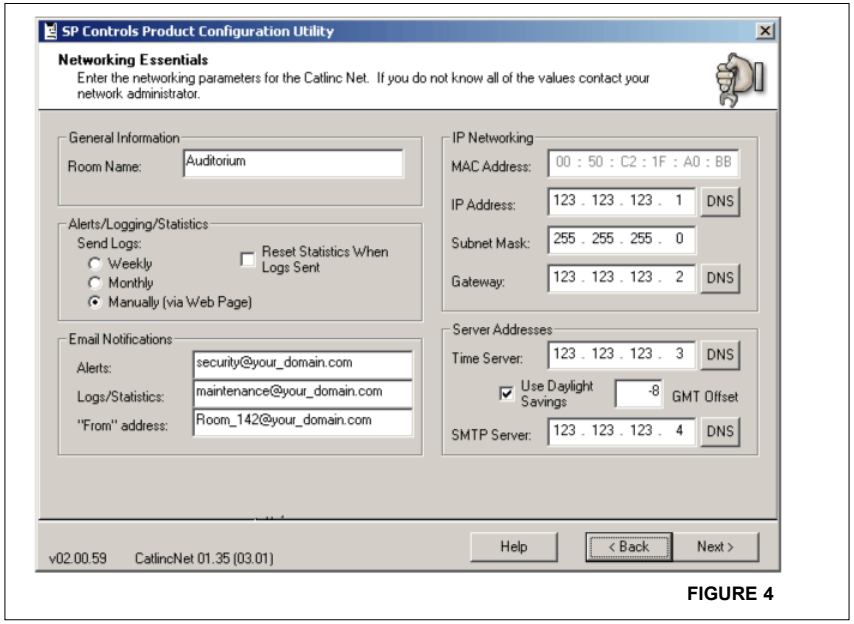


FIGURE 4

Room Name: Assign a room name for the CatLinc Net in this field. It will be displayed on the browser interface, and included for reference in any maintenance or security email.

Alerts/Logging/Statistics: The CatLinc Net can be configured to send email reports of usage information with your SMTP server. Reports can be sent either weekly or monthly, or when triggered by a web user. Email reports are sent in plain text to the address specified below under *Logs/Statistics*.

If the box labeled *Reset Statistics When Logs Sent* is checked the CatLinc Net will compute usage statistics for each weekly or monthly reporting period and then reset to 0. If it is unchecked, the CatLinc Net will take cumulative usage statistics for the life of the room unless manually reset from the *Status and Control* web page (see page 25).

Email Notifications:

The CatLinc Net must be configured with the IP address of an SMTP server for email notification. See page 10 for more information.

Enter the email address to specify report recipients for each field.

Alerts: The CatLinc Net will send alerts under the following conditions:

- The CatLinc Net resets
- The CatLinc Net loses contact with the SmartPanel
- The SmartPanel loses contact with the projector (for projectors that support 2-way RS-232 Communication)
- The CatLinc Net reestablishes contact with the SmartPanel(for projectors that support 2-way RS-232 Communication)
- The SmartPanel reestablishes contact with the projector (for projectors that support 2-way RS-232 communication)
- The CatLinc Net loses contact with the time server

Logs/Statistics: CatLinc Net reports statistical and raw usage data via email. The CatLinc Net sends the following information in the body of a plain-text email:

In [ROOM NAME] ([IP ADDRESS])
version: [CatLinc Net firmware version]
Last Statistics Reset: 6/23/2003 14:33:20
Hours on 140
Avg Daily 3
Avg Weekly 21

1) VCR 15%
2) DVD 33%
3) Laptop 25%
4) PC 27%

IP Networking:

MAC Address: The *Media Access Control* (MAC) Address is a factory-set, hardware level address the device uses to communicate on the Ethernet. It is non-configurable.

IP Address: This is the permanent network address for the CatLinc Net. The System Administrator for your LAN must assign a static IP address permanently to the CatLinc Net. The CatLinc Net is not compatible with DHCP.

Subnet Mask: Enter the subnet mask for your LAN.

Gateway: Enter the LAN Gateway in this field.

Server Addresses:

Time Server: Enter the IP address of a time server providing Simple Time on Port 37 (via UDP). The CatLinc Net uses the time server for all of its time-based functions, such as scheduled lockouts and periodic statistics reporting. A time server is not required, but without access to a time server the CatLinc Net will not be able to use these features.

Note: If an existing server providing Simple Time is not available, shareware implementations for Windows exist. Alternately, if network firewalls allow UDP access to the outside world, NIST (the US government) provides multiple time servers.

For more information on CatLinc Net and time servers, see *Part II, Section IV - Time Server* on page 15 below.

Use Daylight Savings/GMT Offset: If you are using a time server, select or deselect *Use Daylight Savings* depending on your location, and configure the *GMT Offset* based on your Time Zone. In the Continental US:

Pacific Standard Time is	GMT -8
Mountain Standard Time is	GMT -7
Central Standard Time is	GMT -6
Eastern Standard Time is	GMT -5

SMTP Server: Enter the IP address of an SMTP (mail) server on the LAN. The CatLinc Net uses the SMTP server to send email reports and alerts. An SMTP server is not required, but without access to an SMTP server the CatLinc Net will not be able to use its email notification features.

3. Users and Passwords

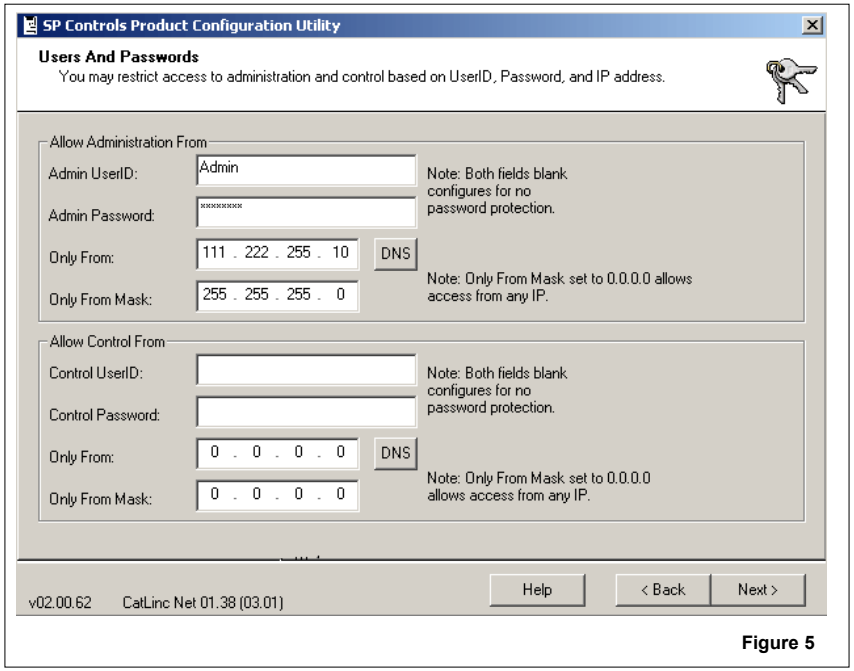

SP Controls Product Configuration Utility
Users And Passwords
You may restrict access to administration and control based on UserID, Password, and IP address.
Allow Administration From
Admin UserID:
Admin
Admin Password:
Only From:
111 . 222 . 255 . 10
DNS
Only From Mask:
255 . 255 . 255 . 0
Note: Both fields blank configures for no password protection.
Note: Only From Mask set to 0.0.0.0 allows access from any IP.
Allow Control From
Control UserID:
Control Password:
Only From:
0 . 0 . 0 . 0
DNS
Only From Mask:
0 . 0 . 0 . 0
Note: Both fields blank configures for no password protection.
Note: Only From Mask set to 0.0.0.0 allows access from any IP.
v02.00.62
CatLinc Net 01.38 (03.01)
Help
< Back
Next >

Figure 5

Security and the CatLinc Net:

The CatLinc Net provides two independent forms of access security for control and configuration via TCP/IP; users must successfully pass both forms of protection to gain access. The first is ID/password protection, where a user attempting control or configuration will be prompted for a User ID and password. The second is IP restriction. When this option is configured, the CatLinc Net will only accept control or configuration from a specified IP address or range of IP addresses.

SP Controls recommends setting security control for the CatLinc Net. Otherwise, any browser or Configuration Utility directed to the CatLinc Net's IP address will be able to control or configure your devices.

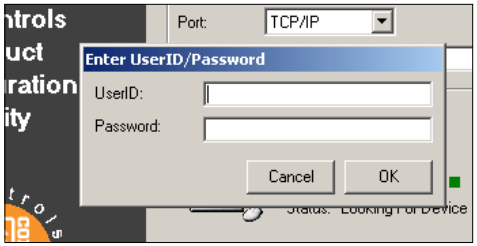


FIGURE 6

If passwords or ID's are lost or forgotten, reset the CatLinc Net passwords with the Product Configuration Utility via RS-232. Configuring the CatLinc Net by RS-232 will never require a password.

Password Protection:

Allow Administration From: In these fields you can restrict access to CatLinc Net configuration via TCP/IP (configuration via RS-232 is never restricted). An Admin ID/password will also allow Control access via HTML.

Admin UserID/Password: Users will be prompted for an Admin UserID and Password when connecting to the CatLinc Net with the Product Configuration Utility via TCP/IP at the beginning of each session.

Allow Control From: In these fields you can restrict control of the CatLinc Net via HTML. A Control ID/password will not allow access to configuration via TCP/IP.

Control UserID/Password: Users will be prompted for an Control UserID and Password when connecting to the CatLinc Net with a web browser via HTML at the beginning of each session.

NOTE: If both IP restriction and password protection are enabled, users who pass IP restriction protection must also pass ID/password in order to control or configure the CatLinc Net.

IP Restriction:

Administration and control of the CatLinc Net may be restricted to commands issued from specified IP addresses for additional security. IP restriction in the *Allow Administration From* restricts configuration via TCP/IP to commands originating from specified IP addresses. IP restriction in the *Allow Control From* restricts browser control of the CatLinc to commands originating from specified IP addresses.

A user attempting to access the CatLinc Net from a disallowed IP Address will be prompted for an ID and Password. They will be unable to pass the password prompt, even if they enter the correct ID/password combination.

Only From: The CatLinc Net will only respond to control or configuration from the IP address specified here. Restricted IP addresses configured here are matched against the Only From Mask, allowing restriction to a field of IP addresses. See below.

Only From Mask: Data in the *Only From* field is summed with the *Only From Mask* to determine which bytes are tested for security restriction. A byte of 255 in the *Only From Mask* field indicates that the use request must match the corresponding byte in the *Only From* field. A byte of 0 in the *Only From Mask* field indicates that the corresponding byte in the *Only From* field will be passed without a check.

You can use the *Only From Mask* in conjunction with the *Only From* field to allow a range of IP Addresses access to the CatLinc Net.

Examples of IP Restriction:

Only From: 111.222.255.10
Only From Mask: 255.255.255.255
Result: Use requests from IP address 111.222.255.10 are allowed (may be subject to password query). Use requests originating from any other IP Address are disallowed.

Only From: 111.222.255.10
Only From Mask: 255.255.255.0
Result: Use requests from IP addresses 111.222.255.0 through 111.222.255.255 are allowed (may be subject to password query).

Only From: 0.0.0.0
Only From Mask: 0.0.0.0
Result: Use requests are allowed from any IP address (may be subject to password query).

Only From: 111.222.255.10
Only From Mask: 0.0.0.0
Result: Use requests are allowed from any IP address (may be subject to password query).

Only From: 111.222.255.0
Only From Mask: 255.255.255.240
Result: Use requests are allowed from IP addresses 255.255.255.0 through 255.255.255.15.

NOTE: Users who pass IP restriction must also pass ID/Password protection (if it is configured) in order to control or configure the CatLinc Net.

4. Hours of Use

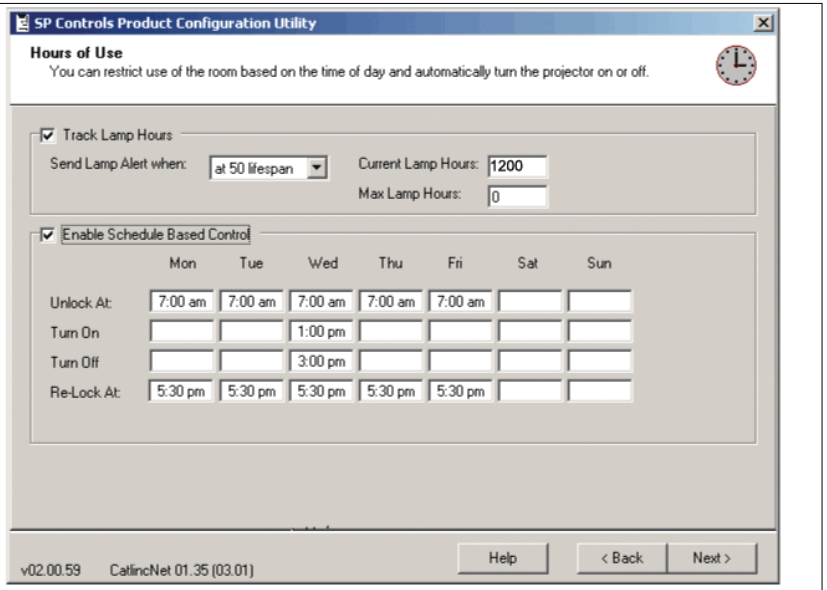


FIGURE 7

Time Server

All of the functions described in this section require that the CatLinc Net can access a time server providing Simple Time on Port 37 (via UDP).

The standard way to maintain coherent time on a network is via time servers. CatLinc Net uses the simplest, lightest, common protocol, Simple Time (defined in RFC 868, runs on UN*X systems as part of the universal INETD).

CatLinc Net is configured to use UDP. The CatLinc Net keeps its own time internally and uses the time server for drift correction. Under normal operation CatLinc Net will synchronize time very infrequently, on the order of fifteen times a week. CatLinc Net can function without access to a time server. However, all of the functions described in this section will be disabled.

Note: If a time server providing Simple Time is not available, shareware implementations for Windows exist. Alternately, if network firewalls allow UDP access to the outside world, NIST (the US government) provides multiple time servers.

Tack Lamp Hours: When the *Track Lamp Hours* option is selected, the CatLinc Net will track projector lamp usage.

Send Lamp Alert when: The CatLinc Net will report via email when the projector lamp has been active for a specified percentage of the projector's lamp life (specified below in *Max. Lamp Hours*). For example, *Set Lamp Alert when at 50 lifespan* will email an alert to the *Alert Notification* email address when the projector lamp has been active for 50% of its projected life.

Current Lamp Hours: If you are installing the CatLinc Net with a used projector, enter the current lamp hours in this field. Many projectors track lamp life and can report it in their onscreen menus. See your projector documentation for more information.

Max. Lamp Hours: Enter the estimated lamp life of your projector in this field. See your projector or lamp documentation for this information.

Enable Schedule Based Control: Select *Schedule Based Control* to configure the CatLinc Net to lock, unlock, power on, or power off the SmartPanel at scheduled times.

Times can be entered in a variety of formats, including:
10:15 PM, 22:00, 10 PM

Locking the SmartPanel
The SmartPanel can be locked in order to prevent unauthorized use of A/V equipment. When the SmartPanel is locked, it cannot be powered on; all other functions continue to work. There is therefore no possibility that a projector will ever be locked on during use. The SmartPanel can always be unlocked manually from the Control web page (see page 23 for more information).

Note: If your CatLinc Net is controlling a SmartPanel equipped with a keylock peripheral (SP Controls part no. *SLB-MINI-KEYLOCK*), an UNLOCK command from either source will override any LOCK command. For example, if the keylock peripheral is set to UNLOCKED and the CatLinc Net is set to lock out the Panel, the SmartPanel will be UNLOCKED.

Unlock At: The CatLinc Net will unlock the SmartPanel at this time.

Turn On: At this time, the CatLinc Net will turn on the SmartPanel and projector. The effect is identical to pressing *POWER ON* on the SmartPanel.

Turn Off: At this time, the CatLinc Net will turn off the SmartPanel and projector. The effect is identical to pressing *POWER OFF* on the SmartPanel.

Re-Lock At: The CatLinc Net will lock at this time. The Panel will remain locked until the next scheduled UNLOCK event.

Tip: Be sure to set an *Unlock At* value after every instance of *Re-Lock At*. Once the SmartPanel is locked, it will remain so for any number of days until it reaches the next scheduled *Unlock At* time. In the sample configuration pictured above (*Figure 7*), the SmartPanel will be locked all weekend from Friday night at 5:30 PM until Monday morning at 7:00 AM.

Tip: If a SmartPanel has been locked with a scheduled lock-out, it can be unlocked manually with a web browser by selecting *UNLOCK* on the *STATUS AND CONTROL* web page. See page 23 below for more information.

5. Save/Download Settings

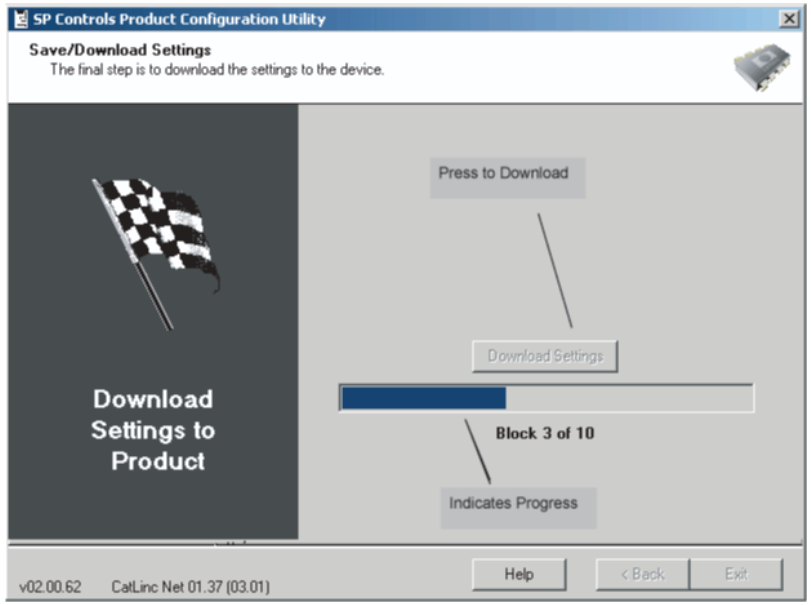


FIGURE 8

When configuration is complete, click on the *Download Settings* button. You will see a progress bar indicate progress, and a message will indicate successful download to the product.

Configuration information is stored in a non-volatile memory. The CatLinc Net can be unplugged for any length of time without losing its configuration information.

Currently, CatLinc Net room configurations cannot be saved to your PC. However, iIf you need to configure multiple CatLinc Nets, you can reuse configuration settings. When you connect a CatLinc Net to the Configuration Utility for the first time, you will be asked “This product has not been configured. Would you like to keep the settings you used to configure the last CatLinc Net?” Select YES to load the same configuration information for the new unit. You will then need to change the specific values that are unique to each unit, such as the static IP address.

Part III. Installation

The CatLinc Net must be connected to 1) the SmartPanel, 2) your LAN, and 3) a 12VDC power supply.

NOTE: When the CatLinc Net is first connected to the SmartPanel it will retrieve important configuration information from the Panel which will affect its display. When the CatLinc Net is first connected, you should not attempt to access the CatLinc Net with a web browser or the Configuration Utility for at least 60 seconds while it completes this process.

1. Connecting the CatLinc Net to the LAN

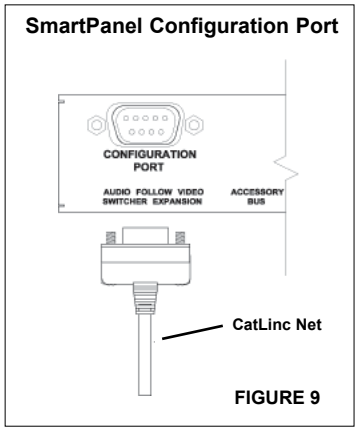
An active Ethernet connection must be available at the CatLinc Net over a CAT5, 5e, or CAT6 twisted pair network cable terminated in a standard RJ-45.

Connect the RJ-45 on the Ethernet cable to the RJ-45 female connection labeled *ETHERNET* on the CatLinc Net. When The CatLinc Net is powered, the green LED labeled LINK will illuminate when an ethernet connection is present.

2. Connecting the CatLinc Net to the SmartPanel

The SmartPanel must be configured and installed normally for use with the CatLinc Net. See the *SmartPanel Configuration and Installation Guide* for more information.

The CatLinc Net cannot be used in an installation with two SmartPanels connected in a Master/Slave configuration.



The CatLinc Net connects to the female DB9 labeled *CONFIGURATION PORT* on the back of the SmartPanel. Attach the CatLinc Net's male DB9 RS-232 cable to the SmartPanel *CONFIGURATION PORT*.

Note: If you extend the RS-232 connection between the SmartPanel and the CatLinc Net with an intermediate Serial Cable, SP Controls strongly recommends you make the extension with a serial cable with all nine pins wired straight through. For the CatLinc Net DB9 pinout, see *Part VII. Technical Specifications* on page 34.

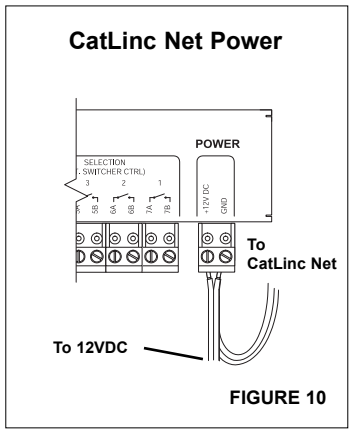
3. Powering the CatLinc Net

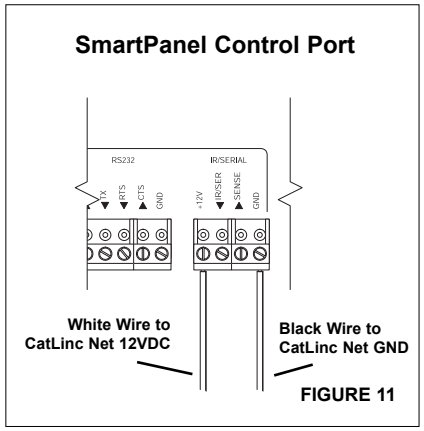
The CatLinc Net draws 9-12VDC. It does not ship with a power supply. Power should be drawn from the back of the SmartPanel. If you want an independent power supply for the CatLinc Net, a 12V power supply can be ordered separately from SP Controls (part no. *SP2-PS*).

Power polarity must be correct or the CatLinc Net will not work. Connection should be as follows:
White Wire: 12VDC
Black Wire: Ground

Power may be drawn from the captive screw connectors landing on the position labeled *POWER* on the SmartPanel. Wires should be brought to the CatLinc Net from the positions labeled *+12VDC* and *GND* (see Figure 10).

Alternately, the CatLinc Net can be powered from the SmartPanel *IR/SERIAL* port. On the SmartPanel *PROJECTOR CONTROL* port, bring a wire from the captive screw connector position labeled *+12V* and the position labeled *GND* (see Figure 11).





Part IV. Using CatLinc Net

Once the CatLinc Net is configured and installed, the CatLinc web server is accessible by any web browser. Simply direct a browser to the static IP address assigned to the CatLinc Net.

Note: Although CatLinc Net has been tested on various browsers, it is possible that non-standard browsers will exhibit display or control quirks. Please contact SP Controls (help@spcontrols.com) if you have any browser-related questions or problems.

1. Status & Control

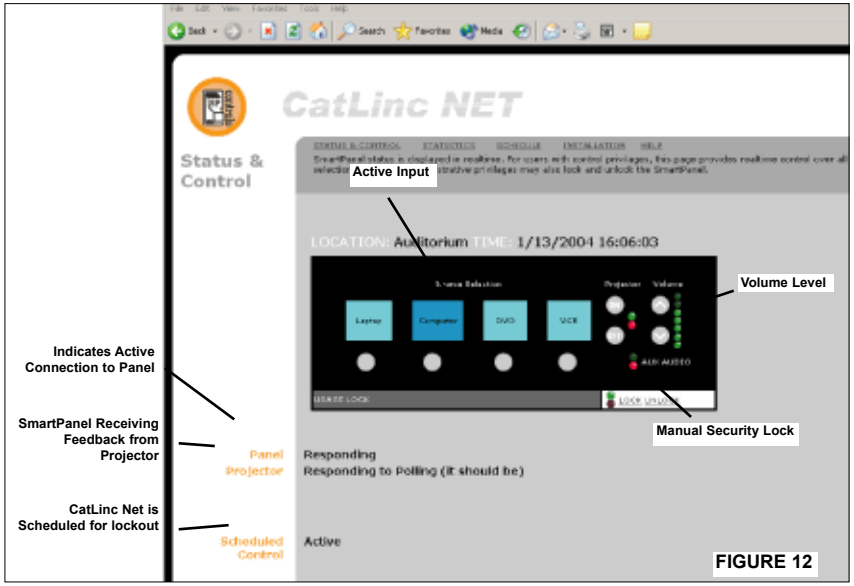


FIGURE 12

The *Status and Control* page is the heart of the CatLinc Net interface with the SmartPanel room. This page displays real-time status information and allows instantaneous control of the SmartPanel. Selecting buttons on the virtual Panel has an identical effect as pressing the physical button on the SmartPanel.

Note: The *Status and Control* web page displays a Small Chassis SmartPanel (*SP2-SMCHAS*), even if you are controlling a Large Chassis SmartPanel (*SP2-CHAS*). This will not affect control.

The SmartPanel display does not auto-update to reflect changes that may have been made in the room. Refresh your browser periodically to retrieve current state information.

The *Status and Control* page gives the following information and control:

Location
The CatLinc Net will report the name configured in the *ROOM NAME* field (see page 8).

Time
If your CatLinc Net is connected to a time server, the CatLinc Net will report current time in this field. Refresh your browser page to update the time display. See *Part II, Section 4 - Hours of Use* on page 15 for more information.

SmartPanel Power
Click on the Projector ON or Projector OFF button to control Projector power.

The SmartPanel power on sequence communicates the projector's initialization process with the READY and WARMUP LEDs. The CatLinc Net will display the SmartPanel's power on sequence. For example, the red LED labeled WARMUP will illuminate while the projector is warming up and is not yet ready to accept commands. For a complete disucssion of the SmartPanel power-on sequence, see the *SmartPanel Configuration and Installation Guide*.

Input Selection
Select any input selection button on the Panel to change Panel and Projector inputs. The selected input is indicated by a darker shade of blue.

Note: Some projectors may take several seconds to change inputs, so there may be a slight delay between making a selection on the *Status and Control* web page and the projector switching.

The CatLinc Net retrieves input names from the SmartPanel. If the input selection fields are not displayed, verify that the SmartPanel is configured with input legend names. You can configure your SmartPanel with room names over the network using the CatLinc Net. See *Part V. Using CatLinc Net to Configure Additional Devices* on page 30.

Volume Level

To control volume, click on the *VOLUME UP* or *VOLUME DOWN* buttons on the SmartPanel image.

The CatLinc Net will display the Panel's current volume level if the CatLinc Net is controlling a SmartPanel that has been configured with absolute volume control, or if it is using an Audio Follow Video Preamp (*SP3-AFVP+*).

If the SmartPanel is configured with relative volume control, the volume display on the *Status and Control* page will only illuminate when a volume command is being sent.

For more information on Absolute versus Relative volume control, see the *SmartPanel Configuration and Installation Guide*.

Ready/Warm-up Status
The green *Ready* LED and red *Warm-up* LED reflect current Panel and projector states. For a complete discussion on what these LED's indicate, see the page 22 above, or the *SmartPanel Configuration and Installation Guide*.

Aux Audio
The CatLinc Net *Aux Audio* indicator will be illuminated green if the SmartPanel's Aux Audio is configured and active. Aux Audio mode allows switching the SP3-AFVP+ audio preamplifier to an audio-only fifth input for use with a audio-only device such as a CD Player. The SmartPanel can then control the volume of the audio-only device without powering on the projector. For more information on the *SP3-AFVP+*, see the *SP Controls SP3-AFVP+ Audio Follow Video Preamp User's Manual*.

If the installation includes an Aux Audio peripheral switch (part no. *SLB-MINI-AUXAUDIO*) wired to RTS on the Panel, then the CatLinc Net cannot activate the fifth audio input. It will indicate whether or not the fifth audio input has been activated from the room. Once it is active you will have volume control from the *Status and Control* page.

If the SmartPanel is configured for Aux Audio but is not wired to a peripheral switch, then you can set the Panel to Aux Audio from the CatLinc Net by clicking on the VOLUME UP button on the *Status and Control* page. This will activate the volume control display and switch the AFVP+ Preamp to the fifth audio input without powering on the projector.

Usage Lock
The virtual LED labeled *LOCK UNLOCK* indicates if the SmartPanel is currently locked. A locked SmartPanel cannot be powered on. A red LED indicates a locked SmartPanel, green indicates that the SmartPanel is unlocked and can be controlled normally. Select *UNLOCK* to unlock the SmartPanel or *LOCK* to lock the SmartPanel.

The SmartPanel can be locked with an electronic keylock peripheral (part no. *SLB-MINI-KEYLOCK*) or scheduled to lock at certain times with the CatLinc Net.

Note: If your CatLinc Net is controlling a SmartPanel equipped with a keylock peripheral (SP Controls Part no. *SLB-MINI-KEYLOCK*), an UNLOCK command from either source will override any LOCK command. For example, if the keylock peripheral is set to UNLOCK and the CatLinc Net is set to lock the Panel, the SmartPanel will be UNLOCKED.

Tip: If a SmartPanel has been locked with a scheduled lockout, it can be unlocked manually with a web browser by selecting UNLOCK.

For further information on locking the SmartPanel with the CatLinc Net, see page 16.

Panel
This field indicates RESPONDING when the CatLinc Net is successfully communicating with the SmartPanel. A communication failure is indicated by NOT RESPONDING.

Projector
This field indicates RESPONDING TO POLLING when the SmartPanel is successfully communicating with the projector via 2-way RS-232.

The CatLinc Net will report if the projector should respond or not, based on whether or not the projector supports two-way RS-232 communication. If the CatLinc Net reports “Projector: NOT RESPONDING (it should NOT be)”, then this is normal behavior given the capabilities of the projector. This means that the projector is not equipped to respond to queries.

2. Statistics

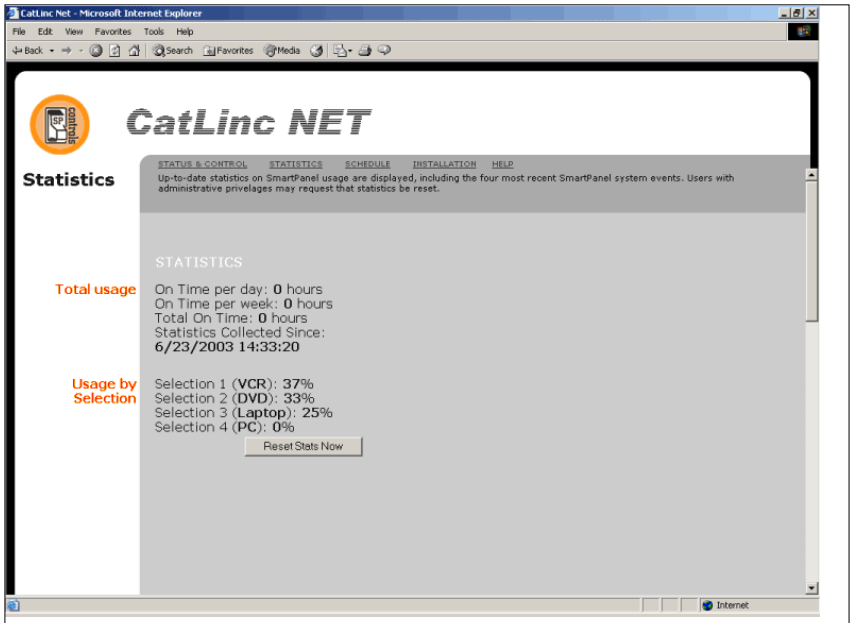

CatLinc Net - Microsoft Internet Explorer
File Edit View Favorites Tools Help
CatLinc NET
Statistics
STATUS & CONTROL STATISTICS SCHEDULE INSTALLATION HELP
Up-to-date statistics on SmartPanel usage are displayed, including the four most recent SmartPanel system events. Users with administrative privelages may request that statistics be reset.
STATISTICS
Total usage
On Time per day: 0 hours
On Time per week: 0 hours
Total On Time: 0 hours
Statistics Collected Since:
6/23/2003 14:33:20
Usage by Selection
Selection 1 (VCR): 37%
Selection 2 (DVD): 33%
Selection 3 (Laptop): 25%
Selection 4 (PC): 0%
Reset Stats Now
Internet

FIGURE 13

CatLinc Net automatically collects statistics on how the SmartPanel system and A/V infrastructure is being used. CatLinc Net can be configured to email statistics to a maintenance contact at the end of the week or month.

NOTE: The CatLinc Net must be in contact with a time server to collect the usage statistics described in this section.

The CatLinc Net can only collect completely reliable statistics if the SmartPanel is verifying projector power status with RS-232 power polling or a power current sensor.

The CatLinc Net can be configured to reset the statistics after email reports are sent out (see *Part II, Section 2 - Networking Essentials* above). Additionally, the statistics can be manually reset by selecting the *RESET STATS NOW* button on this web page. If the statistics are reset, the CatLinc Net will begin tabulating data from zero. Otherwise, it will continue calculating information based on the cumulative life of the installation.

Additional information is available on the Installation page of the CatLinc Net web site. See *Part IV, Section 4 - Installation* on page 28.

CatLinc Net reports the following information:

Total Usage:
On Time per day: Reports average hours the SmartPanel has been on per day in the reporting period.

On Time per week: Reports average hours the SmartPanel has been on per week in the reporting period.

Total On Time: Reports the total time the SmartPanel has been on during the reporting period.

Statistics Collected Since: If the CatLinc Net usage statistics have been automatically reset or have been manually reset on this page, the CatLinc Net will report the time and date of the last reset in this field.

Usage By Selection:
Selections 1-4: Reports percentage of time that each input source has been used in the reporting period.

The CatLinc Net retrieves input names from the SmartPanel configuration. If the input selection fields are not labeled, be sure that the SmartPanel is configured with input legend names. You can configure your SmartPanel with room names over the network via TCP/IP. See *Part V. Using CatLinc Net to Configure Additional Devices* on page 30 for more information.

3. Schedule

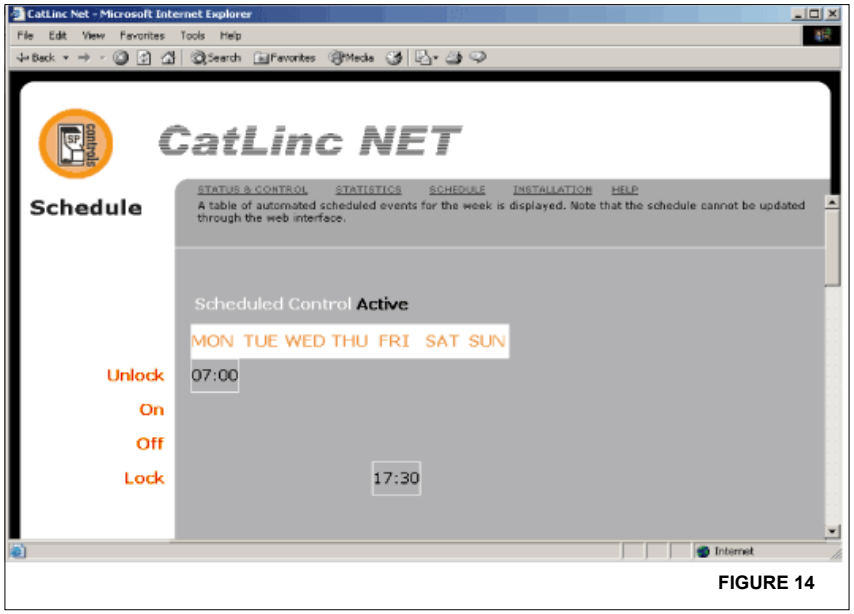

CatLinc Net - Microsoft Internet Explorer
CatLinc NET
Schedule
STATUS & CONTROL STATISTICS SCHEDULE INSTALLATION HELP
A table of automated scheduled events for the week is displayed. Note that the schedule cannot be updated through the web interface.
Scheduled Control Active
MON TUE WED THU FRI SAT SUN
Unlock
07:00
On
Off
Lock
17:30

FIGURE 14

Note: The *Schedule* page is for display only. Scheduled events cannot be modified from the web page. For information on configuring scheduled events, see *Part II, Section 4 - Hours of Use* on page 15 above.

The *Schedule* page displays any scheduled of timed events. Times are displayed in 24 hour time format (e.g., 17:00). Scheduled events will not occur if the CatLinc Net has not been configured with a time server.

Unlock and *Lock* times indicate scheduled lock events. If the Panel is **locked**, users will not be able to turn it on until it is unlocked. If the Panel is locked while in use, users will retain control until the Panel is powered off.

On and *Off* times indicate scheduled power on and power off times.

4. Installation

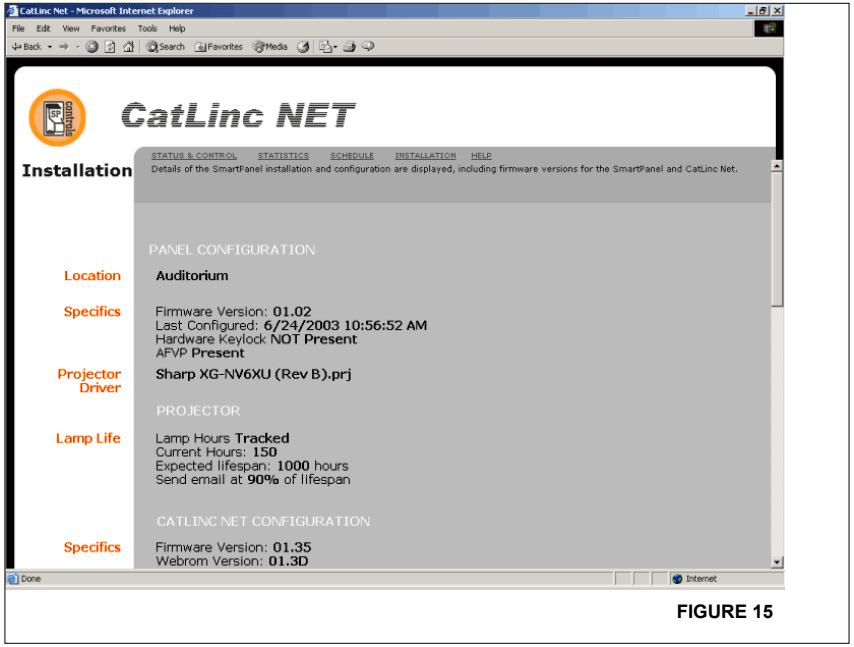


FIGURE 15

The *Installation* page displays information about the SmartPanel, CatLinc Net, and projector infrastructure. This information includes firmware versions for SP Controls Products, configuration information about the SmartPanel (such as the current Projector Driver), and lamp hour information.

Lamp Life - The CatLinc Net can be configured to track the lamp hour usage of projectors that support two-way RS-232 communication. The CatLinc Net may be configured to send email when bulb hours approach the end of their lifespan (see *Track Lamp Hours* in *Part II, Section 4 - Hours of Use* on page 16 above).

5. Help

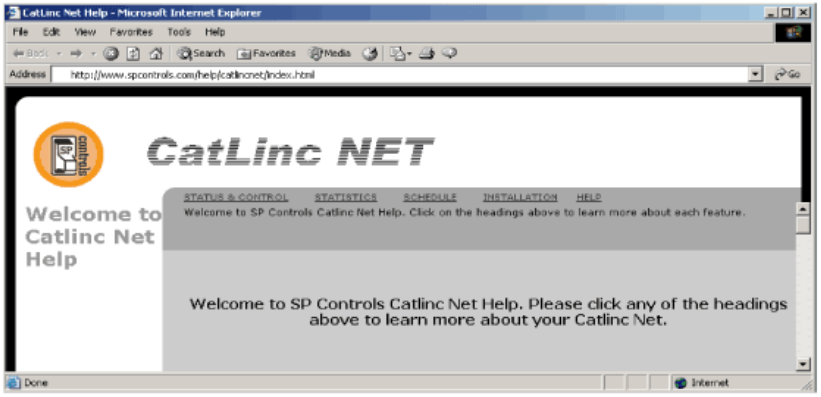

CatLinc Net Help - Microsoft Internet Explorer
CatLinc NET
Welcome to Catlinc Net Help
STATUS & CONTROL STATISTICS SCHEDULE INSTALLATION HELP
Welcome to SP Controls Catlinc Net Help. Click on the headings above to learn more about each feature.
Welcome to SP Controls Catlinc Net Help. Please click any of the headings above to learn more about your Catlinc Net.

FIGURE 16

When you select the Help page, the CatLinc Net opens a new web page hosted by the SP Controls main site. Selecting any of the menu options at the top will open a Help page specific to that aspect of the CatLinc Net web page.

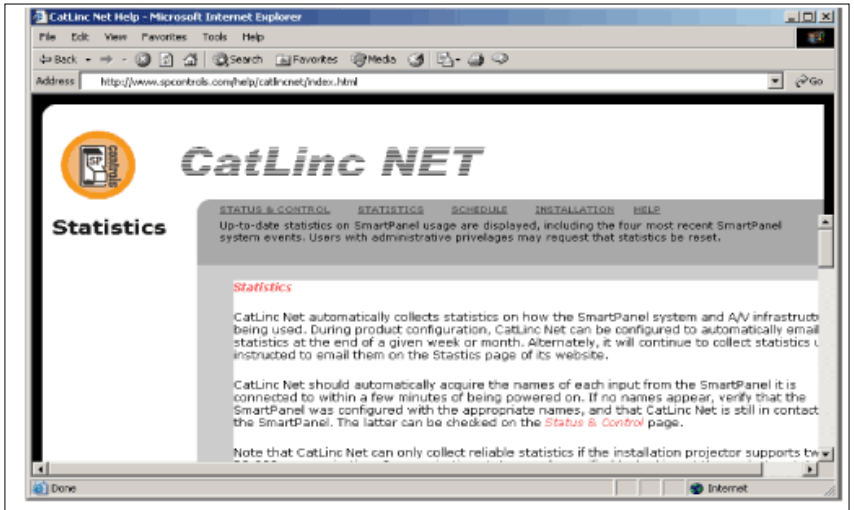

CatLinc Net Help - Microsoft Internet Explorer
CatLinc NET
Statistics
STATUS & CONTROL STATISTICS SCHEDULE INSTALLATION HELP
Up-to-date statistics on SmartPanel usage are displayed, including the four most recent SmartPanel system events. Users with administrative privelages may request that statistics be reset.
Statistics
CatLinc Net automatically collects statistics on how the SmartPanel system and A/V infrastructure being used. During product configuration, CatLinc Net can be configured to automatically email statistics at the end of a given week or month. Alternately, it will continue to collect statistics until instructed to email them on the Stastics page of its website.
CatLinc Net should automatically acquire the names of each input from the SmartPanel it is connected to within a few minutes of being powered on. If no names appear, verify that the SmartPanel was configured with the appropriate names, and that CatLinc Net is still in contact with the SmartPanel. The latter can be checked on the Status & Control page.
Note that CatLinc Net can only collect reliable statistics if the installation projector supports two

FIGURE 17

Part V. Using CatLinc Net to Configure Additional Devices

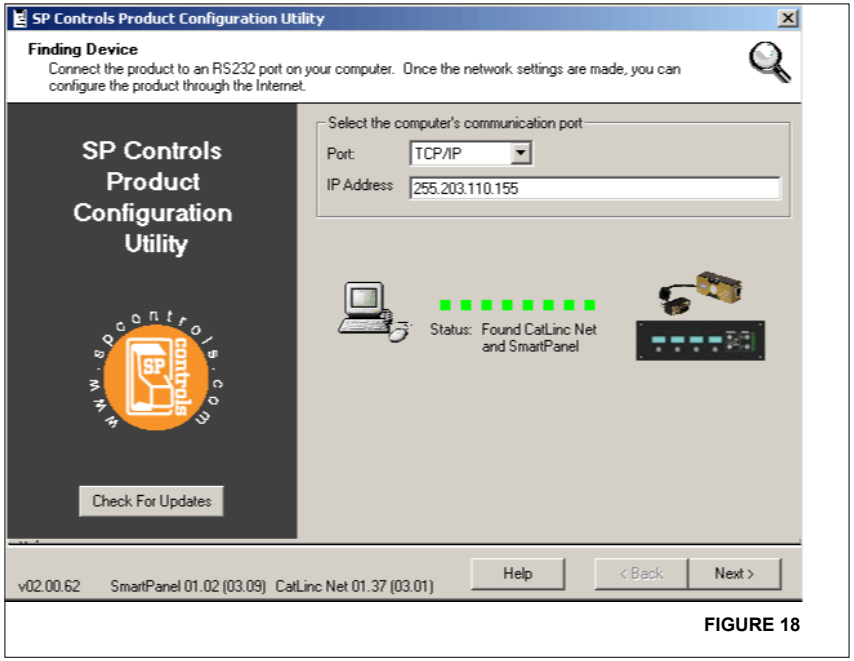

SP Controls Product Configuration Utility
Finding Device
Connect the product to an RS232 port on your computer. Once the network settings are made, you can configure the product through the Internet.
SP Controls Product Configuration Utility
Select the computer's communication port
Port: TCP/IP
IP Address 255.203.110.155
Status: Found CatLinc Net and SmartPanel
Check For Updates
v02.00.62 SmartPanel 01.02 (03.09) CatLinc Net 01.37 (03.01)
Help
< Back
Next >

FIGURE 18

Once configuration and installation has been completed, the CatLinc Net and any connected SP Controls device can be configured or updated over the network via TCP/IP. This includes driver downloads, device firmware upgrades, and reconfiguration.

To reconfigure the CatLinc Net and any connected device (such as the SmartPanel), simply launch the SP Controls Product Configuration Utility and direct it to the IP address of the CatLinc Net. If the CatLinc Net is connected to a SmartPanel, you will be able to configure both the SmartPanel and the CatLinc Net as usual.

Part VI. Troubleshooting

Configuration Troubleshooting	Suggestion:
The SP Controls Product Configuration Utility does not detect the CatLinc Net.	• The first time you configure CatLinc Net, you must configure via RS-232. • Verify the *PORT* pull-down menu is set to the correct COM port or TCP/IP • If the *PORT* pull-down menu is set to *TCP/IP*, verify that you have entered the static IP Address of the CatLinc Net from the *IP Address* field. • When configuring the CatLinc Net via RS-232, be sure that you are connected to your PC COM port with a null-modem serial cable (included). • Check CatLinc power – the *POWER/STATUS* LED should be illuminated solid green.
The Product Configuration Utility is prompting me for a User ID and Password. I don't know the password.	• You can always configure the CatLinc Net via RS-232 without being queried for passwords if necessary. • If the CatLinc Net has been configured with password protection you must supply an *Admin* ID and Password in order to configure the CatLinc Net via TCP/IP. You will not be able to access configuration with a *Control* ID and password. • Has the CatLinc Net been configured for Admin IP security restriction? If you attempt to configure the CatLinc Net from an IP address that is disallowed by CatLinc Net security, you will be prompted for a Password/ID but will be unable to pass. Connect to the CatLinc Net from a legal IP address. • Has the CatLinc Net been configured with a Password/ID which has been forgotten? To reconfigure the CatLinc Net, you will need to connect via RS-232 to bypass and reset the security protection.
I do not have the IP Address or other required configuration information.	• The network configuration information for your CatLinc Net is determined by the administrator of your LAN or WAN. Contact your System Administrator for this information.
I can't retrieve LAN IP addresses using the DNS tab on the Product Configuration Utility.	• In order to retrieve IP information with DNS, the PC or Laptop you are using to configure the CatLinc Net must be on the same network as the CatLinc Net and it must be able to access the DNS server.
I can't set the MAC address of the CatLinc Net.	• The MAC address is a unique device address that is assigned ot the device by the manufacturer. You will not need to change it.

Web Connection Troubleshooting	Suggestion:
I can't locate the CatLinc Net with my web browser.	• The CatLinc Net must be fully configured before you can access the webpage. • To target the CatLinc Net with your Internet browser, you should enter the CatLinc Net's static IP address in the address bar of the browser. • To verify your connection is solid, try pinging the CatLinc Net. If it is correctly connected and configured, it will respond to pings. • If the CatLinc Net has been configured correctly and you are unable to see the webpage, there may be a problem with the physical installation. See *Installation Troubleshooting* below.
I am trying to access the CatLinc Net with my web browser and I'm being prompted for a password. I don't know or have a password.	• Have you forgotten your User ID and Password? Check with the System Administrator. An Administrator can retrieve or reset passwords and ID's with the Product Configuration Utility. • If the Admin User ID and Password are lost as well, you can retrieve and/or reset them by connecting to the CatLinc Net via RS-232 with the Product Configuration Utility. • Has the CatLinc Net been configured with IP security restriction? If you attempt to configure the CatLinc Net from an IP address that is disallowed by CatLinc Net security, you will be prompted for a Password/ID but you will be unable to pass. Connect to the CatLinc Net from a legal IP address.
I can't access CatLinc Net from offsite or outside the network.	• Without special network configuration, if the LAN or WAN that your CatLinc Net is connected to is behind a firewall you will only be able to access the CatLinc Net from a station behind the same firewall. Contact your System Administrator for more information.
Web Display Troubleshooting	**Suggestion:**
My browser is displaying the CatLinc Net strangely.	• For any HTML display abnormality, first try refreshing your internet browser a few times. • The CatLinc Net has been tested on a variety of standard Internet browsers. Some non-standard browsers may have unusual display artifacts. Please contact SP Controls.
The SmartPanel inputs on the CatLinc Net web page are not labeled.	• When you first connect the CatLinc Net to the SmartPanel, you must wait at least 60 seconds to allow the CatLinc Net to retrieve configuration information from the SmartPanel. Do not target the CatLinc Net with a web browser during that interval. If the configuration process has been interrupted, you can begin it again be disconnecting and reconnecting the CatLinc Net to the Panel, or by resetting the CatLinc Net by redownloading the configuration. • The CatLinc Net retrieves input names from the SmartPanel, which should be configured with input labels. To reconfigure the SmartPanel with input labels, see the *Part V* on page 30 above.

Part VI. Troubleshooting

Web Display Troubleshooting cont.'d	**Suggestion:**
Current time is not displayed.	• The CatLinc Net must be configured with the IP address of a time server using Simple Time in order to report time and use time-based functions. Be sure the CatLinc Net is properly configured. See *Part II, Section 2* on page 10 above for more information.
Current time is incorrect.	• The CatLinc Net web pages will not auto-refresh. Try pressing the REFRESH button on your browser. • The CatLinc Net must be configured for the correct time zone by assigning an offset to Greenwich Mean Time (GMT). See *Part II, Section 2* on page 10 above for more information.
The CatLinc Net control web page indicates the projector is not responding.	• The CatLinc Net can only determine the status of projectors which support 2-way RS-232 communication (power polling). If your projector does not support Power Polling, it will always reply Not Responding. To determine if your projector supports 2-way RS-232 communication, check the SP Controls Projector Driver Application Note for the appropriate projector.
Web Control Troubleshooting	**Suggestion:**
I can't turn on or control the Panel.	• If the SmartPanel is LOCKED, then you will be unable to power it on. Check the virtual LED labeled *LOCK UNLOCK*. If the LED is red, the Panel is LOCKED. Select UNLOCK to restore control.
The CatLinc Net is slow to change inputs.	• The CatLinc Net instantaneously sends commands to the SmartPanel, which will execute them immediately. There may be a delay in response time for two reasons: 1. The projector may take time to respond. Some projectors take as long as 8 or 9 seconds to switch inputs. Check the SP Controls Application Note for the appropriate projector driver for more information. 2. There may be a slight delay in updating the web browser (a few seconds).
I don't see the volume display, and when I press VOLUME UP/DOWN nothing changes.	• If the SmartPanel is configured for a projector which uses *Relative Volume*, the Panel will not report the current volume level. See *Part IV, Section 2 - Status and Control – Volume Control* on page 22 and following,
Installation Troubleshooting	**Suggestion:**
I can't access my CatLinc Net via TCP/IP.	• Verify that you entering the correct IP address in your Internet browser or Configuration Utility. • Check the green LED's on the CatLinc Net. Both the *POWER/STATUS* and *LINK* LED's should be illuminated. If one or both are not illuminated, see the next entry.
The LED's on the CatLinc Net are not illuminated.	• If the *POWER/STATUS* LED is unlit, verify that you are drawing +12V DC. Try reversing the polarity of the wires by switching them in the screwdown connector. • If the *LINK* LED is unlit, verify that the CatLinc Net is connected to a live Ethernet connection to your LAN or WAN. Check with your System Administrator for more information • If you are not using pre-terminated CAT5, verify that the RJ45 connector is properly crimped.

Part VII. Technical Specifications

Power:	9-12 VDC, 100 mA
Connectors:	(1) male DB9 (1) female RJ-45 (1) 2-pole captive screw (power)
COM Settings (DB9):	9600 BAUD, 8 bits, No Parity, 1 Stop, No Flow Control
Serial Pinout:	RX 2 TX 3 GND 5 RTS 7 CTS 8
Ethernet Data Rate:	10 Base-T, half-duplex with autodetect
Networking Protocol:	Ethernet, HTTP including SimpleAuth, TCP/IP, UDP, SMTP, ARP, and ICMP.
Size:	Metal Housing: 2.5" (L) x 1.15" (W) x 0.95" (H)
Approx. Cable Length:	6"
Weight:	4.5oz

Appendix I - Changing Firmware

Attention: Follow these instructions exactly. The CatLinc Net firmware controls all functions of the CatLinc Net. An improper download of firmware to the CatLinc Net may render the unit inoperable.

NOTE: When possible, we recommend that you perform a firmware upgrade via RS-232 instead of via TCP/IP.

Firmware upgrades may become available to improve functionality or patch bugs. If it becomes necessary to upgrade your SP Controls Product Firmware, you will use the SP Controls Product Configuration Utility.

SP Controls strongly recommends that you periodically check for available firmware upgrades. To do so, open your Configuration Utility on a PC or laptop with an active Internet connection. Click on the button labeled *CHECK FOR UPDATES*. The Configuration Utility will automatically download any new drivers, firmware files, or documents that are available from SP Controls.

I. When you connect to the CatLinc Net the Configuration Utility will automatically detect any new firmware versions available for download to the unit.

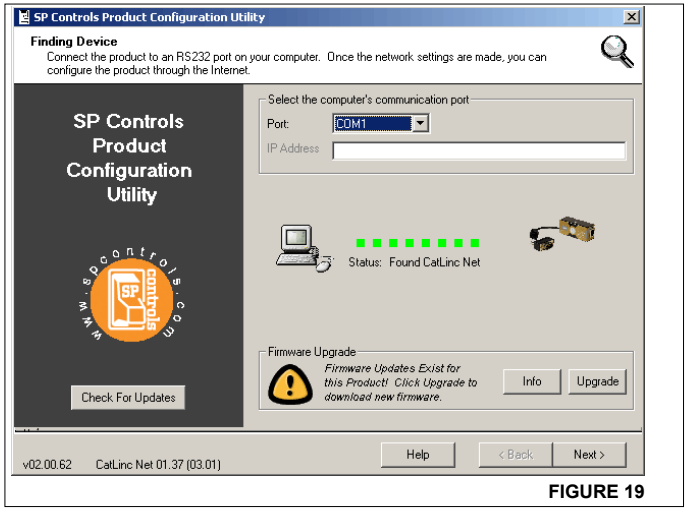

SP Controls Product Configuration Utility
Finding Device
Connect the product to an RS232 port on your computer. Once the network settings are made, you can configure the product through the Internet.
SP Controls Product Configuration Utility
Select the computer's communication port
Port: COM1
IP Address
Status: Found CatLinc Net
Firmware Upgrade
Firmware Updates Exist for this Product! Click Upgrade to download new firmware.
Info
Upgrade
Check For Updates
v02.00.62
CatLinc Net 01.37 (03.01)
Help
< Back
Next >

FIGURE 19

II. Click on UPGRADE to open a dialog box that will automatically prompt you to download the latest firmware version to the CatLinc Net. The download process takes about two to three minutes to complete.

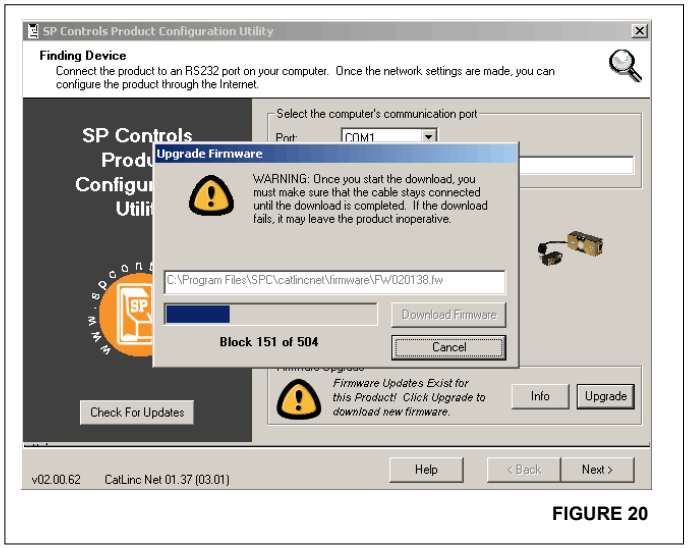

SP Controls Product Configuration Utility
Finding Device
Connect the product to an RS232 port on your computer. Once the network settings are made, you can configure the product through the Internet.
Select the computer's communication port
Port: COM1
Upgrade Firmware
WARNING: Once you start the download, you must make sure that the cable stays connected until the download is completed. If the download fails, it may leave the product inoperative.
C:\Program Files\SPC\catlincnet\firmware\FW020138.fw
Download Firmware
Block 151 of 504
Cancel
Firmware Updates Exist for this Product! Click Upgrade to download new firmware.
Info
Upgrade
Check For Updates
v02.00.62
CatLinc Net 01.37 (03.01)
Help
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FIGURE 20

Warning: Once you begin the firmware download, do not interrupt the procedure until it is complete! Interruption of the download can disable the CatLinc Net.

Appendix I - Changing Firmware

III. The Configuration Utility progress bar will indicate when the download has been successfully completed.

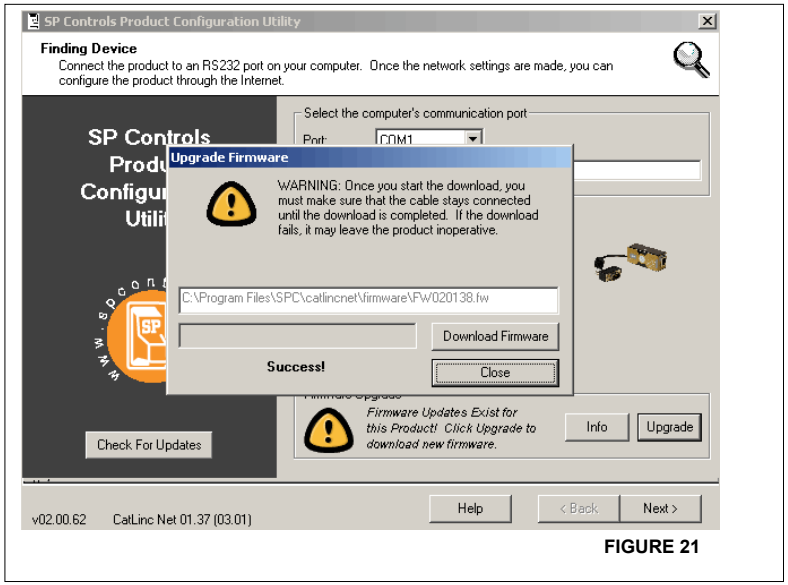
SP Controls Product Configuration Utility
Finding Device
Connect the product to an RS232 port on your computer. Once the network settings are made, you can configure the product through the Internet.
Select the computer's communication port
Port:
COM1
Upgrade Firmware
WARNING: Once you start the download, you must make sure that the cable stays connected until the download is completed. If the download fails, it may leave the product inoperative.
C:\Program Files\SPC\catlincnet\firmware\FW020138.fw
Download Firmware
Success!
Close
Firmware Updates Exist for this Product! Click Upgrade to download new firmware.
Info
Upgrade
Check For Updates
v02.00.62
CatLinc Net 01.37 (03.01)
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FIGURE 21

IV. Once the download has been successfully completed, you can close the Configuration Utility.

Note: If you download firmware via TCP/IP: After the CatLinc Net receives new firmware, it will automatically reset and begin retrieving configuration information from the SmartPanel. It is important that you not target the CatLinc Net with a web browser for at least 60 seconds after completing the download.

After this time has elapsed or the CatLinc has been reconnected to the Panel, it should function normally given its new operational parameters.

Note: After upgrading CatLinc Net firmware, confirm that the CatLinc Net's configuration has not been impacted by retrieving configuration information with the Configuration Utility. In most circumstances, CatLinc Net configuration will not be affected by upgrading firmware. If CatLinc Net configuration is affected, restore the appropriate configuration and redownload to the unit.

WARRANTY

SP Controls warrants all CatLinc products and accessories against defects in materials and workmanship for a period of three years from the date of purchase.

Although SP Controls thoroughly tested and reviewed this documentation, there is no warranty, express or implied, with respect to quality, merchantability, or fitness for a particular purpose. Therefore, the CatLinc and accessories are provided "as-is" and the purchaser assumes the entire risk as to quality and performance.

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Configuration Worksheet

To configure the CatLinc Net for installation, you will need the following information from your Network Administrator. See *Part II. Section 2 - Networking Essentials* and *Part II.Section 3 - Users and Passwords* (pages 8 and following) for more information.

Networking

Email Notification Addresses:

Alerts (receives security and maintenance alerts)

_____

Logs/Statistics (receives periodic maintenance logs)

_____

IP Networking

IP Address (static IP address permanently assigned to CatLinc Net)

_____

Subnet Mask (LAN or WAN Subnet Mask)

_____

Gateway (LAN or WAN Gateway) _____

Server Addresses

Time Server (providing Simple Time on port 37 via UDP)

_____

GMT Offset (offset from Greenwich Mean Time)

_____

SMTP (mail server) _____

Security - Admin (configuration)

(Note: Admin users allows Control access as well)

Admin User ID _____

Admin Password _____

Only From (Admin only allowed from specified IP address):

_____

Only From Mask (255 = byte must match, 0 = disregard):

_____

Security - Control (access to web-based control)

Control User ID _____

Control Password _____

Only From (Control only allowed from specified IP address):

_____

Only From Mask (255 = byte must match, 0 = disregard):

_____